

presented corresponds to a particular mode of operation of the device, and may include only those keys needed to operate that particular mode.

[0108] While the segmented optical shutter device may traverse only the keypad region, in the exemplary embodiment the segmented optical shutter device traverses both the keypad region and the high-resolution display. The segmented optical shutter device is further configured to selectively transition from an opaque state to a translucent state.

[0109] While embodiments of the invention may be applied to any of a number of different devices, the exemplary device will include the following exemplary modes of operation: a radiotelephone mode, a navigational mode, a gaming mode, or a media player mode. It will be clear to those of ordinary skill in the art having the benefit of this disclosure that other modes, subsets of these modes, and alternate combinations of subsets of these modes may be used.

[0110] One benefit of embodiments of the present invention is that multiple input devices and modes may be integrated into a single, compact physical space. The touch sensitive components, including the capacitive sensor (203) and the resistive sense layer (206), combined with a “stealth” lighting feature provided by the segmented optical shutter (204) and the electroluminescent device (205), serve to create a multimodal input mechanism that may be optimized for case specific tasks in the various modes of the device (100).

[0111] By way of example, in one mode, controls to navigate long lists of data, such as the song titles of a music collection, can be illuminated and used. In another mode, the keys necessary to provide telephone dialing or text messaging input can be illuminated and used. More generally, embodiments of the invention may be used to aid users in task completion through the hiding and revealing of alternate keypad configurations, thereby eliminating unnecessary visual information.

[0112] Turning now to FIG. 18, illustrated therein is the exemplary multimodal electronic device 1800 when in the OFF mode. The view of FIG. 18 may also arise when the exemplary multimodal electronic device 1800 is in a low power state, a sleep state or an idle mode. When the segmented optical shutter device 1801 covers both the keypad region (106) and the high resolution display (209), the dynamic user interface surface 1802 of the exemplary multimodal electronic device 1800 will be blank when the device is in this state. This occurs because each of the shutters is closed (i.e. in the opaque state), thereby prohibiting visibility of either the high resolution display (209) or any of the plurality of keypad configurations. In one embodiment, the exemplary multimodal electronic device 1800 comprises a housing 1803 having a color. The color of the housing 1803 is chosen to be complimentary or substantially similar to the color of the dynamic user interface surface 1802 when the shutters are closed, so that the device in the OFF or low-power mode is smooth, uniform, and of a single or complimentary colors.

[0113] Turning now to FIG. 19, illustrated therein is the exemplary multimodal electronic device 1800 having changed from the OFF state (or alternatively the low power state) to an ON state. The multimodal electronic device 1800 may be converted from the OFF or low power mode to an ON mode in one of a variety of ways. A first method, as noted above, is for a user to actuate the proximity sensor. A second method, discussed in more detail below, is from an external event. When transitioning from the OFF state or low power state to the ON state, the multimodal electronic device 1800

opens at least one display segment of the segmented optical shutter device 1801, thereby transitioning that segment to the translucent state. Either one configuration of the plurality of keypad configurations 1900, or the high-resolution display 209, then becomes visible to the user. In one embodiment, when the segmented optical shutter device 1901 is in the ON state, at least a curved scroll device 1903 is presented on the dynamic user interface surface 1802.

[0114] Now turning to FIG. 20, illustrated therein is one embodiment of the exemplary multimodal electronic device 1800 where one of a plurality of available keypad configurations is presented to a user. Several keypad configurations may be presented to the user by selective actuation of the segmented optical shutter device 1901. Each of these keypad configurations includes a plurality of mode based actuators. One such configuration is that of a ten-digit keypad actuator set 2000, including the numbers 0 through 9 and a curved scroll device 1903. In one embodiment, the segmented optical shutter device 1801, being in one ON state, presents the ten-digit keypad actuator set 2000 and the curved scroll device 1903 on the dynamic user interface surface 1802. Note that the segmented optical shutter device 1801, when in another ON state as will be shown below, may present a different set of mode based actuators.

[0115] In one embodiment, the ten-digit keypad actuator set 2000 may be present when the device is operating in a telephone mode. A user to dial a telephone number may use the ten-digit keypad actuator set, for example. Further, the user may use the curved scroll device 1903—in the telephone mode—to scroll through a list of telephone numbers when selecting a specific number to call. To keep the curved scroll device 1903 large and easily accessible, the exemplary embodiment of FIG. 20 presents the ten-digit keypad actuator set 2000 within a region circumscribed by the curved scroll device 1903. Those of ordinary skill in the art having the benefit of this disclosure will recognize that the ten-digit keypad actuator set 2000 and the curved scroll device 1903 may be presented separately. In other words, the ten-digit keypad actuator set 2000 may be presented without the curved scroll device 1903 and vice versa. Alternatively, they may be presented together and have a codependent relationship.

[0116] In one embodiment, the plurality of mode-based actuators 1902 further comprises a plurality of directional arrows 2001. The plurality of directional arrows 2001 may be used for a wide range of functions within the exemplary multimodal device 1800. These functions may include scrolling through telephone menus, browsing stored images, implementing controls on game, and so forth. In one embodiment, the segmented optical shutter device 1801 is configured to present the plurality of directional arrows 2001 in a region disposed outside a perimeter of the curved scroll device 1903. One embodiment may allow for additional mode based actuators to be present within—or on top of—the curved scroll device 1903 to, in combination with the plurality of directional arrows 2001, constitute control for a highly functional mode. One such highly functional mode might require, for example, directional controls, telephone dialing indicia, and media playback buttons.

[0117] In one embodiment the plurality of mode-based actuators 1902 further comprises a send key 2002 and an end key 2003. The send key 2002 and the end key 2003 may be presented on the dynamic user interface surface 1802 when the segmented optical shutter device 1801 is in one ON state in